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HIGH-SPEED MACHINING OF METALS

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One of the most effective means of increasing the productive capacity of equipment in machine-building plants and more fully utilizing the potentialities of machine-tool pools is the broad introduction of high-speed methods of metal machining. These methods were conceived and used for the first time in Soviet plants by Stakhanovite innovators. The scientific and theoretical grounds were laid by Engineer N. I. Shchelkonogov in 1936.

Up to the present time, little progress in the dissemination of such methods has been made. They are, for the most part, used in milling machines, occasionally in universal and turret lathes, and almost never in multispindle and unispindle automatic lathes. This was all the more unfortunate in view of the fact that just such lathes as this latter type (turret, facing, vertical boring-and-turning, and boring) made up 35 to 40 percent of the heavy-duty machinery in our machine-tool shops and formed the largest single group of machine installations.

It is obvious that the fulfillment of the postwar Five-Year Plan ahead of schedule depends on the adoption of high-speed cutting methods on lathes of all types.

The Soviet hard-alloy industry is producing a wide variety of blades which are essential for arming high-speed instruments of every kind. Stakhanovite experience and laboratory tests have convincingly demonstrated that high-speed cutting can step up productive capacity as much as 25 times.

High-speed cutting was not widely adopted until recently because the question of the proper use of hard alloys, in most cases, was being decided unscientifically, by estimation, or by more or less unsystematic experimentation.

The Lathe Laboratory of the Scientific Research and Experimental Institute of the Bearing Industry tackled the problem. The laboratory solved it first from the point of view of bearing-plant conditions under which extremely tough and hard chrome steels had to be dealt with continually. In the past, all lathe

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operations were carried on with high-speed steel cutters at a speed of 24 to 28 meters per minute. Experimenting with different types of hard alloys, the Institute found the "VK-8" alloy the most effective under the given conditions. It also discovered that the most important characteristic for durability of cutting tools was accurate, extremely careful finishing of the face of the tool itself. Irregularities so minute as to be invisible to the naked eye caused rapid dulling of the instrument. The most durable finishing cutting tools, it was shown, were made with the assistance of cast-iron discs and boron-carbide pastes.

The installation of a complete set of hard-alloy cutters on all the semi-automatic "ZR8-114" lathes in the Plant imeni Ordzhonikidze lathe pool raised the output 40 to 50 percent.

Since 1945 the Lathe Laboratory, in connection with the manufacture of hard titanium-cobalt alloys, has been conducting experiments and has introduced nine new types of hard alloys in plants. The best results were obtained with the "T5K10" alloy.

The use of this alloy for blades for machining bearing raceways on automatic machines increased cutting speed 27 to 70 percent and the productivity of the machine 25 to 60 percent.

If technical conditions make increased speed impossible, the use of "T5K10" is still economical because the durability of such instruments is 140 to 400 percent higher (depending on the operation).

Brigades of the Institute and plant workers adopted this new type of hard alloy in production at the First Bearing Plant imeni L. M. Kaganovich and the Kharkov Bearing Plant. Production data completely substantiated laboratory research: productivity of the machines rose 25 to 50 percent.

The new alloy was widely adopted during the following 5 months throughout the ball-bearing industry. Five plants use "T5K10" exclusively. Machines of various types turning out the most labor-consuming and massive bearing raceways switched over to working completely with cutters of hard alloys. Thanks to them, the speed of cutting went up to 70 to 112 meters per minute. In general, about two-thirds of all cutting instruments in bearing plants at the present time are made of hard alloys.

High-speed machining of metals is of great significance to the national economy. Increasing the productive capacity of the country's pool of machine tools two to three times will result in the saving of millions of rubles.

Further introduction of high-speed cutting of metals must come from technicians, leading workers, and the management of the plants. Our Institute stands ready to help them.

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